

# Supply Chain Analysis of Small Industry Smoke Roa Fish processing in Kinabuhutan Village, West Likupang District North Minahasa Regency

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**Abstract**— Distribution is an integral part of the supply chain of a product. The role of distribution greatly determines the distribution of a product to reach consumers. An efficient process is needed that can ensure that the product reaches consumers widely and at the lowest possible cost. A business should have an efficient distribution channel, so that the business can dominate the market.

The purpose of this study was to determine the system of cooperation between roa fishing fishermen and smoked roa fish processors in Kinabuhutan Village and to determine the amount of marketing efficiency at each raw material supply node in Kinabuhutan Village. The population in this study were roa fishers, fish processors, middlemen and retailers. Data were collected using purposive sampling. The data collected in the form of primary data and secondary data. Primary data collection techniques with observation and interviews. The data obtained were analyzed using quantitative descriptive analysis and qualitative descriptive analysis.

Based on the results of the study, there are five main components or actors in supply chain analysis, namely fishermen, smoked roa fish processors, middlemen, retailers and final consumers. In addition, there are 3 types of flow in the supply chain, namely product flow, financial flow and information flow. The flow of smoked roa fish products flows from upstream to downstream or from fishermen to final consumers. Meanwhile, financial flows flow from downstream (downstream) to upstream (upstream) or from consumers to fishermen and the flow of information is a flow that flows from two directions, namely from upstream to downstream (downstream) or from fishermen to consumers and from downstream (downstream) to upstream (upstream) or from consumers to fishermen. From the results of the analysis, it is also known that the marketing of smoked roa fish products is very efficient because all nodes have an efficiency value < 1, but the most efficient is at the fishermen's node because the value is equal to 0.

**Keywords**— Supply Chain, Smoke Roa, Kinabuhutan.

## I. INTRODUCTION

Distribution is an integral part of the supply chain of a product. The role of distribution greatly determines the distribution of a product to reach consumers. An efficient process is needed that can ensure that the product reaches consumers widely and at the lowest possible cost. A business should have an efficient distribution channel, so that the business can dominate the market. Efficient

marketing distribution can be done by reducing the number of distributors, reducing distribution costs, reducing promotional costs, increasing sales from each distributor, increasing sales quantity for each customer, increasing profits from distributors and also from customers (Suseno, 2008).

Kinabuhutan Village is one of the coastal villages located on a small island called Kinabuhutan Island and is

included in the Likupang Barat sub-district, North Minahasa Regency. The average population of Kinabuhutan Village works as a fisherman and most of them are traditional fishermen. One of the catches of fishermen in Kinabuhutan Village is roa fish or julung-julung which is the raw material for the smoked roa fish processing industry. Previously, the processing of smoked roa fish only utilized the excess catches of local fishermen so that they were not damaged and could be stored longer. However, now it is a commercial business, the produce in the form of smoked roa fish has been marketed outside the village or Kinabuhutan Island.

The problem is that the sustainability of the smoked roa fish processing business is very dependent on the continuity of the supply of fresh roa fish as the main raw material. For this reason, cooperation is needed between various parties involved in the smoked roa fish processing industry, both business actors and the government in maintaining the availability of raw material supplies to the hands of smoked roa fish processors and end consumers. According to Vermulen et al. (2008), value chain analysis is used to assess all business activities and their relationships in the supply chain. This value chain analysis aims to overcome inefficiency constraints such as variability, reduce vulnerability and increase capacity to adapt to change.

This study aims to determine the system of cooperation between roa fishing fishermen and smoked roa fish processors in Kinabuhutan Village and to determine the amount of marketing efficiency at each supply node of raw materials in Kinabuhutan Village. This research is expected to increase the awareness of fishermen and smoked roa fish processors on the importance of mutually beneficial cooperation for the sustainability of their respective businesses. Fishermen and smoked roa fish processors have an interdependent relationship, fishermen need smoked roa fish processors as potential consumers and smoked roa fish processors need fishermen as suppliers of industrial raw materials. The greater the percentage at each supply node, the more efficient the

existing supply chain, so that it can result in an increase in fishermen's income which will be followed by an increase in the welfare of the community in Kinabuhutan Village in general and fishermen in particular.

## II. RESEARCH METHODS

This type of research is descriptive research. Descriptive research is a method that is intended to describe existing phenomena, both present and past. This research does not manipulate or change the independent variables, but describes the conditions as they are. Descriptive research can describe a situation only, but can also describe the situation in its stages of development

The population in this study was divided into 4 groups, namely roa fishermen, smoked roa fish processors, middlemen and retailers. The total population of fishermen and smoked roa fish processors can be said to be homogeneous so that the sampling for each group is enough for 1 person, for the marketing area there are 4 marketing areas namely Bitung, Airmadidi, Manado and Tomohon, 1 middleman and 1 retailer are taken each. . With such a number of samples in this study there were 10 people, namely 1 fisherman, 1 smoked roa fish producer and 4 intermediary traders with different marketing areas and 4 retailers, which were taken by purposive sampling. Primary data collection was carried out by observation, interviews guided by questionnaires and documentation. The data analysis used is quantitative descriptive analysis and qualitative descriptive analysis. Qualitative descriptive analysis is data processing that is carried out through logical considerations with systematic author languages. The analyzed data is then interpreted with logical considerations using the author's systematic languages by referring to references related to research results, journals (Fathoni, 2006). The data that has been collected is analyzed using steps that are often called triangulation, proposed by Miles and Huberman (1994) in Sugiyono (2010), namely: (1) Data reduction; (2) Data Display; and (3) Conclusion, as shown in Figure 1

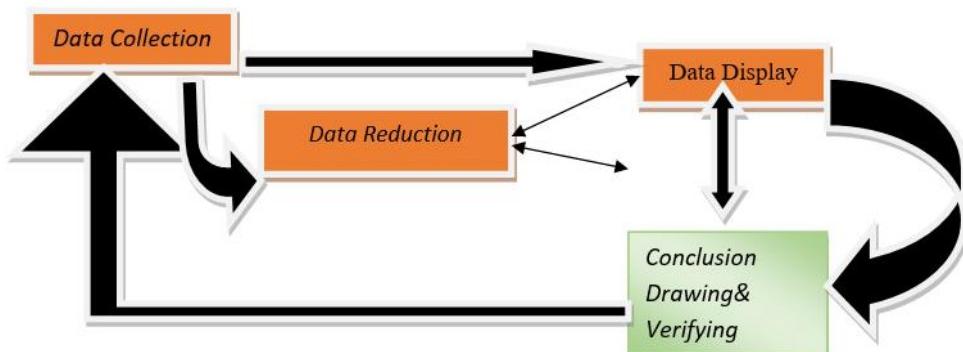


Fig.1: Interactive Model Data Analysis

### III. RESULTS AND DISCUSSION

#### State of the research area

Kinabuhutan Village is one of the coastal villages located on a small island called Kinabuhutan Island and is included in the Likupang Barat sub-district, North Minahasa Regency. The average population of Kinabuhutan Village works as a fisherman and most of them are traditional fishermen. One of the catches of fishermen in Kinabuhutan Village is Julung-Julung fish or in the local language called Roa fish. The catch obtained by fishermen must be marketed as soon as possible

#### Fresh Roa Fish Supply Fisherman

The catch of roa fish in Kinabuhutan Village is only marketed in Kinabuhutan Village, because it is constrained by the perishable nature of the fish and the small and traditional production scale of the catch and the limited financial position of fishermen. The catch of roa fish in Kinabuhutan Village exceeds the amount of demand, especially when it is the fish season so that there is an excess of production or supply. Roa fish that are not sold will be damaged if it is not processed, if it has to be sold outside Kinabuhutan Island it takes time for transportation which can reduce the quality or quality of the fish.

#### Smoked Roa Fish Industry

Smoking fish is one way of preserving fish which is a combination of the process of salting, drying, and giving smoke. Smoking has several advantages, namely providing a preservation effect, affecting taste, taking advantage of excess catch when the catch is abundant, this allows fish to be stored longer until the lean season, and increases the availability of protein for the community throughout the year. Smoked fish becomes durable because of the reduction in water content as a result of the heating process and the presence of chemical compounds in the smoke such as the phenol group which can inhibit the growth of microorganisms and act as antioxidants.)

In Kinabuhutan Village, there are 3 entrepreneurs who process smoked roa fish. Thus the problem of excess roa catches in Kinabuhutan Village has been resolved because all roa catches can be accommodated and purchased as raw material for smoked roa fish with the same selling price of Rp. 500,- per fish from fishermen. This is very helpful for fishermen in marketing their catch.

Based on the results of the interview, it is known that the costs incurred in the Smoked Roa Fish Processing Business per production with an average production of 150 pins are Rp. 1.789.250, -. Thus the production cost of smoked roa fish per pin is Rp. 12,000,- The production in the form of smoked roa fish is sold for Rp. 20,000, - per pin and marketing costs in the form of sea transportation to

Likupang are Rp. 100,000, - and eat and drink coffee and the cake is Rp. 30,000, - so that the total marketing costs incurred by the producer are Rp. 130.000,-. In one marketing, an average of 1000 pins of smoked roa fish are brought in. Thus, the marketing cost per pinch spent by smoked roa fish producers is Rp. 130, - so that the profit or margin obtained by smoked roa fish producers is Rp. 7,870, - per pin.

#### Intermediary Trader

The production of smoked roa fish originating from Kinabuhutan Village is quite large so that the marketing area is not only in Kinabuhutan Village but spreads to Likupang, Bitung, Manado and Tomohon through intermediary traders. This middleman picks up roa fish from Kinabuhutan Village directly at the Likupang port where transportation ships from Kinabuhutan dock. The middleman buys smoked roa fish from Kinabuhutan Village for Rp. 200,000,- per bunch containing 10 pins or Rp. 20,000,- per pin or gepe. Then these middlemen supply smoked roa fish to retailers in markets in Manado, Bitung, Tomohon and Airmadidi.

The costs incurred at the intermediary level vary depending on the marketing area, in general the brokerage fees incurred are only for vehicle rental costs and meals. Based on the results of interviews with intermediary informants from Bitung and Manado, the cost for renting a pick-up vehicle is the same, namely Rp. 250,000 and a meal of Rp. 25,000, with a load of 300 flops for those in Bitung and 500 flops for those in Manado. Thus the cost at the intermediary level per pin for the Bitung marketing area is Rp. 915, -, while for the Manado marketing area it is Rp. 550, -. For intermediary traders in Airmadidi only use 2-wheeled vehicles so that the costs incurred are only for gasoline costs of Rp. 25,000, - and only drinking coffee and cakes for Rp. 10,000, - so a total of Rp. 35,000, -. The smoked roa fish that is transported is not much, only 100 pins, so the cost per pin is Rp. 350,. Lastly, for middlemen in the marketing area of Tomohon, the cost of renting a vehicle is up to Rp. 400,000, - and eating 2 people is Rp. 50,000, - so the total cost is Rp. 450,000, - while the smoked roa fish transported reached 500 flops. Thus the cost per pin is Rp. 900, -

#### Retailer

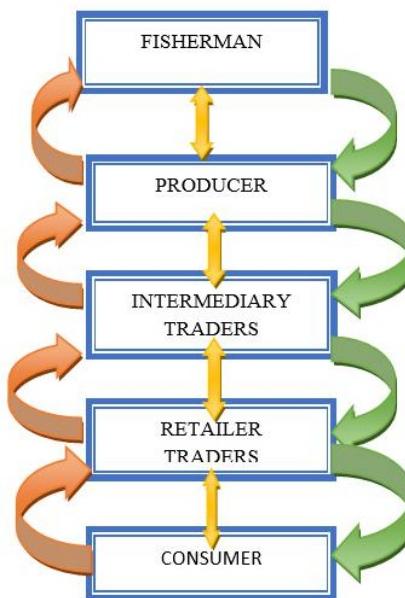
Retailers who are used as informants are retailers who are marketed in their marketing areas. The costs incurred by retailers who are in the market are generally only costs for eating and drinking because smoked roa fish are delivered by intermediary traders directly based on orders. The cost for eating and drinking coffee and cake per day for retailers in the market is the same in all marketing areas, which is Rp. 30,000, - because that is the general standard

of their costs while in the market. However, the price at each retailer varies according to the marketing area. The average smoked roa retailer in the market not only sells smoked roa but also sells almost all kinds of salted fish so that the marketing costs cannot be charged to the sale of smoked roa only but share with other types of processed fish. Smoked roa fish retailers sell about 20 types of salted fish from various types of anchovies to various types of salted reef fish with various levels of selling prices. Therefore, in analyzing marketing costs by retailers per type of fish, it is obtained that Rp. 30,000,- is divided by 20 types of fish sold so that per type is charged a fee of Rp. 1,500,- Likewise, Smoked Roa Fish which is successfully sold by each retailer is not same, this will affect the marketing cost per pin. The selling price per pin for marketing the city of Bitung is Rp. 30,000 with a capital of Rp. 26,075,- so that retailers in Bitung earn a profit of Rp. 3,925. The selling price per pin for marketing Airmadidi is Rp.28,500,- with a capital of Rp.25,150,- so that retailers in Airmadidi earn a profit of Rp.3,350,-. The selling price per pin for marketing in Manado City is Rp. 30,000,- with a capital of Rp. 26,075,- so that retailers in Manado City earn a profit of Rp. 3,925,-. The selling price per pin for marketing in Tomohon City is Rp. 32,000,- with a capital of Rp. 27,100,- so that retailers in Tomohon City get a profit of Rp. 4,900,-.

### Supply Chain Analysis of Smoked Roa Fish Industry

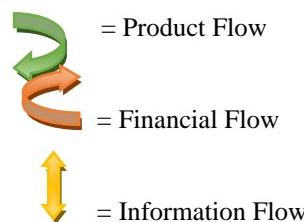
According to Assauri (2011) supply chain analysis or supply chain analysis involves continuous relationships regarding goods, money and information. Goods generally flow upstream to downstream, money flows from downstream to upstream, while information flows both from upstream to downstream and from downstream to upstream. Viewed horizontally, there are five main components or actors in the supply chain, namely suppliers (suppliers in this study are fishermen), manufacture (factories that make goods in this study are the smoked roa fish processing industry), distributors (intermediary traders), retailers (traders) retailer), customer (customer). Vertically, there are five main components of the supply chain, namely buyer (buyer), transporter (transporter), warehouse (storage), seller (seller) and so on.

Based on the results of interviews and direct observations that researchers did during the research process on the smoked trout processing industry in Kinabuhutan Village, a model was obtained that describes the supply chain flow of the smoked roa fish processing industry in Kinabuhutan Village, as can be seen in the following figure:



*Fig.2: Supply Chain of Smoked Roa Fish Processing Industry in Kinabuhutan Village*

Information:



In general, the supply chain of smoked roa fish processing industry in Kinabuhutan Village is as shown in Figure 1. Supply chain actors consist of fishermen as suppliers of raw materials in the form of fresh roa fish, then smoked roa fish processing producers, intermediary traders, retailers and final consumers. There are 3 types of flow in the supply chain, namely product flow, financial flow and information flow.

The product flow in the supply chain of smoked trout in Kinabuhutan Village is a channel that flows from upstream to downstream. The catch of fishermen in the form of fresh roa fish is the raw material for the smoked roa fish processing industry. The excess catches of fishermen have led to the idea of preserving the catches of fishermen by means of smoke so that they can last up to several months. This idea was followed by several people because if only one person has a smoked roa fish processing business, then all of the excess catches of fishermen have not been accommodated, after 3 people who have a smoked roa fish processing industry business, all the catches of fishermen are absorbed, so the problems

faced by fishermen in Kinabuhutan Village can be resolved.

The flow of fresh roa fish flows into the smoked roa fish processing industry, after going through several stages in the production process of smoked roa fish then it is taken by boat to Likupang to be marketed, and there are waiting for middlemen who are ready to accommodate the flow of smoked roa fish products. The middlemen are then ready to supply smoked roa fish products to retailers in traditional markets in Bitung, Airmadidi, Manado and Tomohon. The final consumer buys smoked roa fish products at the market closest to where they live.

The financial flow in the supply chain of smoked roa fish processing industry in Kinabuhutan Village is a flow that flows from downstream (downstream) to upstream (upstream). Final consumers buy smoked roa fish products at different prices according to where they live in Bitung and Manado at a price of Rp. 30,000 per pin, for the Airmadidi area at a price of Rp. 28,500,- per pin and for the Tomohon area it is Rp. 32,000,- per clip. These retailers buy smoked roa fish products from intermediaries at different prices according to the marketing area. In Bitung and Manado the price is IDR 26,000 per pin, for the Airmadidi area it is IDR 25,000 per pin and for the Tomohon area it is IDR 27,000 per pin. Meanwhile, the middlemen all buy from the smoked roa fish processing industry at the same price, which is Rp. 20,000,-. The smoked roa fish processing industry buys raw materials from fishermen for Rp. 500,- per fish or raw materials per pinch for Rp. 10,000,- because each pinch consists of 20 fresh roa fish. The entire financial flow in the supply chain of smoked roa fish uses cash transactions because in Kinabuhutan Village itself there is no Automated Teller Machine (ATM), because electricity only turns on once every 2 days.

The flow of information in the supply chain of smoked trout fish processing industry in Kinabuhutan Village is a flow that flows from two directions, namely from upstream to downstream and from downstream to upstream. Among supply chain actors, the information provided is information about product prices, product quality, product inventory and the number of purchases.

Supply chain actors from upstream will provide information about product prices, product quality and product inventory while supply chain actors from downstream directions will provide feedback such as prices, appreciation or complaints about product quality and the number of orders and purchases. This information is all done through the internet using a cellphone.

### **The Relationship between Fishermen and the Smoked Roa Fish Processing Industry**

The relationship that exists between fishermen as suppliers of raw materials for smoked roa fish production and the smoked roa fish processing industry is very good because they realize that their businesses are interdependent with each other. Fishermen are very dependent on the smoked fish processing industry to accommodate their catch, without the smoked fish processing industry in Kinabuhutan Village, fishermen will find it very difficult to market their catch. Another alternative if the fishermen do not sell their catch to the smoked roa fish processing industry is that the fishermen must sell directly to the Likupang market which is about 1 hour away by boat, in addition to time consuming it will also increase transportation costs. The length of the trip will reduce the quality of the fish caught which results in a decrease in the selling price. This is very detrimental to fishermen, so the existence of smoked roa fish processing industry in Kinabuhutan Village is strongly supported by fishermen, so that the relationship between the two is very well established. Their relationship is the foundation for the sustainability of their respective businesses.

The smoked roa fish processing industry also feels that its business is very dependent on the catch of fishermen, because without fishermen, their business will stop because there are no raw materials to be processed. It is the awareness of this interdependence that causes a very good relationship between fishermen and the smoked roa fish processing industry in Kinabuhutan Village. Their communication and information can be done through cellphones or directly because Kinabuhutan Village is not large, it is only a small island that can be surrounded in just an hour on foot. Transportation in Kinabuhutan village is only by walking everywhere there is no public transportation.

### **Relationship between Smoked Roa Fish Processing Industry and Intermediary Traders**

The relationship between the smoked roa fish processing industry and intermediary traders has existed for a long time because they always communicate via cellphones to discuss the flow of smoked roa fish products that will be sent from Kinabuhutan Village both regarding the price and the quantity available. The number of requests from intermediary traders is adjusted to the smoked roa fish products produced by the industry in Kinabuhutan Village. Delivery of smoked roa fish products from Kinabuhutan Village to Likupang if by chance there is no need for smoked roa fish processors to Likupang, it can be entrusted to the captain of the existing transportation ship with a transportation fee of Rp. 10,000,- per 1000 pins, as

well as the payment money can be deposited because they already have a relationship of mutual trust. The trust of smoked roa fish processors with intermediary traders or vice versa intermediary traders against smoked roa fish processors is the main capital in their relationship.

### **Relationship between Brokers and Retailers**

Intermediaries supply smoked roa fish products to retailers located in several marketing areas. Their relationship is also based on trust, because sometimes middlemen supplying smoked roa fish products do not immediately get cash, sometimes they have to wait a few days before the smoked roa fish products are sold, but this only happens occasionally. Retailers also more often pay in cash to intermediaries, sometimes in debt, but there is still trust between middlemen and retailers or vice versa. This high level of trust that underlies their relationship in business continues to run smoothly

### **Efficiency of each node of the smoked roa fish supply chain**

According to Downey and Erickson (1992) in Ismail et al (2008) that the marketing system is said to be efficient if the value of marketing efficiency is  $< 1$ . The value of marketing efficiency is a comparison of product value with marketing costs incurred at each marketing node. In table 5 it can be seen that the marketing of smoked roa fish products is very efficient because all nodes have an efficiency value of  $< 1$ , but the most prominent and most efficient is the fishermen's node because the value is equal to 0. This is because to sell their catch, fishermen do not require marketing costs. because from the sea the fishermen immediately docked behind the smoked roa fish processing industry which was on the beach in Kinabuhutan Village. This also makes the marketing of fresh roa fish very efficient. For more details, the value of the marketing efficiency of smoked roa fish products for each node can be seen in Table 1.

*Table 1: Value of Marketing Efficiency of Smoked Roa Fish Products for Each Node*

No.	Knot	Cost (Rp/pin)	Product Value (Rp/pin)	Eficiency Value (Rp/pin)
1	Fisherman	0	10.000	0
2	Processors	130	20.000	0,0065
3	Brokers			
	Bitung	915	26.000	0,0352
	Airmadidi	350	25.000	0,0140
	Manado	550	26.000	0,0212
	Tomohon	900	27.000	0,0333
4	Retailer Merchant			
	Bitung	75	30.000	0,0025
	Airmadidi	150	28.500	0,0053
	Manado	75	30.000	0,0025
	Tomohon	100	32.000	0,0031

Source: primary data processed, 2021.

In table 1 it can be seen that all the nodes in the marketing of smoked roa fish products are very efficient, but the most efficient are the fishermen's nodes, this is because there are no marketing costs incurred by fishermen.

### **IV. CONCLUSION**

Based on the results of the study, there are five main components or actors in supply chain analysis, namely fishermen, smoked roa fish processors,

middlemen, retailers and final consumers. In addition, there are 3 types of flow in the supply chain, namely product flow, financial flow and information flow. The flow of smoked roa fish products flows from upstream to downstream or from fishermen to final consumers. Meanwhile, financial flows flow from downstream (downstream) to upstream (upstream) or from consumers to fishermen and the flow of information is a flow that flows from two directions, namely from upstream to downstream (downstream) or from fishermen to consumers and from downstream (downstream) to

upstream (upstream) or from consumers to fishermen. From the results of the analysis, it is also known that the marketing of smoked roa fish products is very efficient because all nodes have an efficiency value < 1, but the most efficient is at the fishermen's node because the value is equal to 0.

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